

DEH

Cather-Herley Oil Company

P.O. Box 7397

Long Beach, CA 90807

Phone: (562) 424-2523; Fax: (562) 981-2108

Email: HerleyOffices@herley-kelleyco.com

RECEIVED

JUN 17 2015

RWQCB-CVR
FRESNO, CALIF.

June 12, 2015

Central Valley Water Board
1685 E Street
Fresno, CA 93706

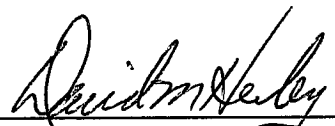
Att: Ronald Holcomb

Re: Technical Report for Produced Water
Ponds

Dear Mr. Holcomb,

Please find enclosed the Technical report for our produced water ponds as requested by the Central Valley Regional Water Quality Control Board, per California Water Code Directive pursuant to Section 13267.

Sincerely,



David M. Herley, Manager

Technical Report

June 15, 2015

Re: Produced Water Ponds
Cather-Herley Oil Company
California-Federal "A" Lease
CAS 071813-A

The following report is hereby submitted as required by letter I received, dated: April 1, 2015 from the Central Valley Regional Water Control Board, signed by Clay L. Rodgers, Assistant Executive Officer, and is meant to comply with the California Water Code Directive Pursuant to Section 13267.

The letter asks that a technical report be submitted in reference to the California-Federal A Lease, operated by Cather-Herley Oil Company, in the Asphalto Oil Field, and which discharges produced water into four (4) water ponds connected in series.

The requested information is as follows:

1. Identification of any discharges of oil field produced waters to land, including but not limited to ponds, since April of 2014 that are not listed in Attachment A.

Answer: In addition to the ponds, a portion of the oil field produced waters are also discharged into our injection well #31; (A.P.I. # 02935880) located on the same lease.

2. Collect representative samples of wastewater within each of the ponds. Samples must be analyzed in accordance with the water quality analysis and reporting requirements contained in Attachment B to this Order.

Answer: Please see Attachment A. for lab reports.

- Associated Laboratories – Sample date 04/20/15
- BC Laboratories – Sample date 03/26/15
- Midway Laboratory, Inc – Sample date 03/26/15
- Midway Laboratory, Inc – Sample date 03/26/15

3. All available information for each of the surface impoundment(s), including dimensions, latitude and longitude, Assessor's Parcel Numbers of the lease, duration of the discharge (in months), and the volume of wastewater discharged per year.

Answer: For dimensions, latitude and longitude, please see Attachment B. Assessor's Parcel Numbers: 15722006005; 06821035007; 06821034004.

Duration of discharge is 12 months. Volume of wastewater discharged in 2014 is 74,007 bbls. to ponds, and 54,413 bbls. to injection well.

4. A location map that includes:
 - All surface impoundments at the Facility,
 - Include the boundary lines for all leases at the Facility,
 - and legend with the name of the surface impoundments.

Answer: Please see Attachment B.

Further, please note: Also enclosed, as Attachment C, is a January 16, 2004 letter signed by Dean Hubbard and Shelton Gray of the California Regional Water Quality Control Board referencing a 2003 Hydrogeologic Characterization Report of the Asphalto Oilfield, which was written by Geomega, Inc., in which both Engineering Geologists concur and agree that Cather-Herley Oil Company's water disposal operation "would not pose a threat to waters of state".

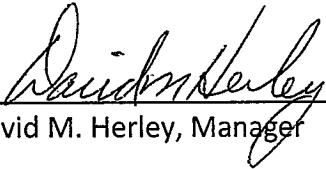
Clay Rodgers and Ryan West have both informed me that the CRWQCB has the 2003 Geomega Report in its files, and that it is not necessary that I mail it to you.

Further, Doug Patteson informed me on 4-15-15 that we don't need an engineer to sign and approve our Technical Report since we just operate one facility with four ponds connected in series.

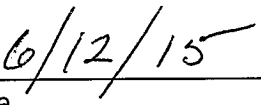
Further, as requested:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

This concludes my disclosure of information as requested for this Technical Report.



David M. Herley, Manager



Date

ATTACHMENT

A



Associated Laboratories
806 N. Batavia - Orange, CA 92868
Tel: (714)771-6900 Fax: (714)538-1209
www.associatedlabs.com
info@associatedlabs.com



Client: Cather-Herley Oil Co.
Address: PO Box 7397
Long Beach, CA 90807

Lab Request: 355169
Report Date: 05/27/2015
Date Received: 04/20/2015
Client ID: 15228

Attn: Curtis Elliot

Comments: Cal-Fed Pond

EPA methods 200.8 Uranium, 900 Gross Alpha, 903, Ra-05 were analyzed by FGL. Please see attached report.

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods. Methods accredited by NELAP are indicated on the report. This cover letter is an integral part of the final report.

<u>Sample #</u>	<u>Client Sample ID</u>
355169-001	Pond #1

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

Approved By:

Helene Gardner, Ph.D. / Technical Director or
Hongling Cao / District Manager

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 45 days from date reported.

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Matrix: Water
 Sampled: 04/20/2015 08:00
 Sample #: 355169-001

Client: Cather-Herley Oil Co.
 Site:
 Client Sample #: Pond #1

Collector: Client
 Sample Type:

Analyte	Result	DF	RDL	Units	Analyzed	By	Notes
Method: ALO 6036		Prep Method:		QCBatchID:			
See Attached		1					
Method: EPA 200.7		Prep Method: EPA 3010A		QCBatchID: QC1154782			
Antimony	ND	50	1	mg/L	04/28/15	kedy	
Arsenic	ND	50	0.25	mg/L	04/28/15	kedy	
Barium	39.9	50	0.5	mg/L	04/28/15	kedy	
Beryllium	ND	50	0.05	mg/L	04/28/15	kedy	
Cadmium	ND	50	0.25	mg/L	04/28/15	kedy	
Calcium	92.0	1	0.1	mg/L	04/23/15	kedy	
Chromium	ND	50	0.5	mg/L	04/28/15	kedy	
Cobalt	ND	50	0.25	mg/L	04/28/15	kedy	
Copper	ND	50	0.5	mg/L	04/28/15	kedy	
Iron	1.72	50	1	mg/L	04/28/15	kedy	
Lead	ND	50	0.25	mg/L	04/28/15	kedy	
Lithium	11.1	10	0.01	mg/L	04/29/15	kedy	
Magnesium	31.3	1	0.1	mg/L	04/23/15	kedy	
Manganese	ND	50	0.5	mg/L	04/28/15	kedy	
Molybdenum	ND	50	0.5	mg/L	04/28/15	kedy	
Nickel	ND	50	0.5	mg/L	04/28/15	kedy	
Potassium	862	50	25	mg/L	04/28/15	kedy	
Selenium	ND	50	0.5	mg/L	04/28/15	kedy	
Silver	ND	50	0.25	mg/L	04/28/15	kedy	
Sodium	13000	50	25	mg/L	04/28/15	kedy	
Strontium	35.6	50	2.5	mg/L	04/28/15	kedy	
Thallium	0.328	50	0.25	mg/L	04/28/15	kedy	
Vanadium	ND	50	0.25	mg/L	04/28/15	kedy	
Zinc	ND	50	0.5	mg/L	04/28/15	kedy	
Method: EPA 200.8		Prep Method: Method		QCBatchID:			
See Attached		1					
Method: EPA 218.6		Prep Method: Method		QCBatchID: QC1154876			
Hexavalent Chromium	ND	1	1	ug/L	04/27/15	wei	T3
Method: EPA 300.0		Prep Method: Method		QCBatchID: QC1154757			
Sulfate	3.41	1	1	mg/L	04/20/15	wei	
Nitrate, as Nitrogen	ND	1	0.1	mg/L	04/20/15	wei	
Bromide	92.2	25	12.5	mg/L	04/21/15	wei	
Method: EPA 625		Prep Method: 3510C		QCBatchID: QC1154789			
Naphthalene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Acenaphthylene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Acenaphthene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Fluorene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Phenanthrene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Anthracene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Fluoranthene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Pyrene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Benz(a)anthracene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Chrysene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Benzo(b)fluoranthene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Benzo(a)pyrene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Indeno(1,2,3-cd)pyrene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Dibenz(a,h)anthracene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	
Benzo(g,h,i)perylene	ND	1.21	12.1	ug/L	04/22/15	qnguyen	

ASSOCIATED LABORATORIES

36594-01

Analytical Results Report
 Lab Request 355169, Page 2 of 13



Matrix: Water	Client: Cather-Herley Oil Co.	Collector: Client
Sampled: 04/20/2015 08:00	Site:	
Sample #: 355169-001	Client Sample #: Pond #1	Sample Type:

Analyte	Result	DF	RDL	Units	Analyzed	By	Notes
<u>Surrogate</u>	<u>% Recovery</u>		<u>Limits</u>	<u>Notes</u>			
2,4,6-Tribromophenol (SUR)	129		34-141				
2-Fluorobiphenyl (SUR)	455		45-118	S			
2-Fluorophenol (SUR)	134		41-91	S			matrix interference (matrix was really bad,
Nitrobenzene-d5 (SUR)	192		41-119	S			
p-Terphenyl (SUR)	125		71-134				
Phenol-d5 (SUR)	132		34-74	S			
Method: EPA 7470A NELAC					Prep Method: Method		
Mercury					QCBatchID: QC1154865		
	ND	1	0.4	ug/L	04/27/15	JParedes	
Method: EPA 8015B NELAC					Prep Method: EPA 3535A		
TPH (C6 to C10)					QCBatchID: QC1154783		
	3.1	10.5	2.1	mg/L	04/27/15	lyt	
TPH (C10 to C22)	9.9	10.5	2.1	mg/L	04/27/15	lyt	
TPH (C22 to C36)	ND	10.5	3.15	mg/L	04/27/15	lyt	
<u>Surrogate</u>	<u>% Recovery</u>		<u>Limits</u>	<u>Notes</u>			
Triacontane (SUR)	140		60-140				
Method: SM 2320-B					Prep Method: Method		
Bicarbonate (HCO3)					QCBatchID: QC1154797		
	3660	10	50	mg/L	04/21/15	hanhkhong	
Carbonate (CO3)	ND	1	5	mg/L	04/21/15	hanhkhong	



QC Batch ID: QC1154757	Analyst: wei	Method: EPA 300.0
Matrix: Water	Analyzed: 04/21/2015	Instrument: AAICP (group)

Blank Summary

Analyte	Blank Result	Units	RDL	Notes
QC1154757MB1				
Bromide	ND	mg/L	0.5	
Chloride	ND	mg/L	1	
Nitrate, as Nitrogen	ND	mg/L	0.1	
Nitrate, as NO3	ND	mg/L	0.44	
Nitrite, as Nitrogen	ND	mg/L	0.1	
Nitrite, as NO2	ND	mg/L	0.33	
Sulfate	ND	mg/L	1	

Lab Control Spike/Lab Control Spike Duplicate Summary

Analyte	Spike Amount		Spike Result		Units	Recoveries		RPD	Limits		Notes
	LCS	LCSD	LCS	LCSD		LCS	LCSD		%Rec	RPD	
QC1154757LCS1											
Bromide	25		24.3		mg/L	97			90-110		
Chloride	50		47.1		mg/L	94			90-110		
Nitrate, as Nitrogen	5.64		5.55		mg/L	98			90-110		
Nitrate, as NO3	25		24.6		mg/L	98			90-110		
Nitrite, as Nitrogen	7.62		7.01		mg/L	92			90-110		
Nitrite, as NO2	25		23.0		mg/L	92			90-110		
Sulfate	50		47.1		mg/L	94			90-110		

Matrix Spike/Matrix Spike Duplicate Summary

Analyte	Sample Amount	Spike Amount		Spike Result		Units	Recoveries		RPD	Limits		Notes
		MS	MSD	MS	MSD		MS	MSD		%Rec	RPD	
QC1154757MS1, QC1154757MSD1												Source: 355199-001
Bromide	ND	25	25	22.9	22.8	mg/L	92	91	0.4	80-120	20	
Chloride	92.7	50	50	120	120	mg/L	55	55	0.0	80-120	20	M
Nitrate, as Nitrogen	29.3	5.64	5.64	29.1	29.1	mg/L	0	0	0.0	80-120	20	NC
Nitrate, as NO3	130	25	25	129	129	mg/L	0	0	0.0	80-120	20	NC
Nitrite, as Nitrogen	ND	7.62	7.62	6.67	6.66	mg/L	88	87	0.2	80-120	20	
Nitrite, as NO2	ND	25	25	21.9	21.8	mg/L	88	87	0.5	80-120	20	
Sulfate	101	50	50	127	127	mg/L	52	52	0.0	80-120	20	M



QC Batch ID: QC1154782	Analyst: MAlam	Method: EPA 200.7
Matrix: Water	Analyzed: 04/22/2015	Instrument: AAICP (group)

Blank Summary						
Analyte	Blank Result	Units		RDL	Notes	
QC1154782MB1						
Antimony	ND	mg/L		0.02		
Arsenic	ND	mg/L		0.005		
Barium	ND	mg/L		0.01		
Beryllium	ND	mg/L		0.001		
Boron	ND	mg/L		0.05		
Cadmium	ND	mg/L		0.005		
Calcium	ND	mg/L		0.1		
Chromium	ND	mg/L		0.01		
Cobalt	ND	mg/L		0.005		
Copper	ND	mg/L		0.01		
Iron	ND	mg/L		0.02		
Lead	ND	mg/L		0.005		
Lithium	ND	mg/L		0.01		
Magnesium	ND	mg/L		0.1		
Manganese	ND	mg/L		0.01		
Molybdenum	ND	mg/L		0.01		
Nickel	ND	mg/L		0.01		
Potassium	ND	mg/L		0.5		
Selenium	ND	mg/L		0.01		
Silver	ND	mg/L		0.005		
Sodium	ND	mg/L		0.5		
Strontium	ND	mg/L		0.05		
Thallium	ND	mg/L		0.005		
Vanadium	ND	mg/L		0.005		
Zinc	ND	mg/L		0.01		

Lab Control Spike/ Lab Control Spike Duplicate Summary											
Analyte	Spike Amount		Spike Result		Units	Recoveries			Limits		Notes
	LCS	LCSD	LCS	LCSD		LCS	LCSD	RPD	%Rec	RPD	
QC1154782LCS1											
Antimony	2		2.10		mg/L	105			80-120		
Arsenic	2		1.98		mg/L	99			80-120		
Barium	2		2.06		mg/L	103			80-120		
Beryllium	2		1.89		mg/L	95			80-120		
Boron	2		2.01		mg/L	101			80-120		
Cadmium	2		2.04		mg/L	102			80-120		
Calcium	2		2.28		mg/L	114			80-120		
Chromium	2		2.06		mg/L	103			80-120		
Cobalt	2		2.03		mg/L	102			80-120		
Copper	2		2.03		mg/L	102			80-120		
Iron	2		2.06		mg/L	103			80-120		
Lead	2		2.02		mg/L	101			80-120		
Lithium	2		1.77		mg/L	89			80-120		
Magnesium	2		2.32		mg/L	116			80-120		
Manganese	2		2.04		mg/L	102			80-120		
Molybdenum	2		2.06		mg/L	103			80-120		
Nickel	2		2.00		mg/L	100			80-120		
Potassium	20		16.9		mg/L	85			80-120		
Selenium	2		1.89		mg/L	95			80-120		
Silver	1		1.05		mg/L	105			80-120		
Sodium	2		2.20		mg/L	110			80-120		

ASSOCIATED LABORATORIES

Analytical Results Report

36594-01

Lab Request 355169, Page 5 of 13



QCBatchID: QC1154782	Analyst: MAlam	Method: EPA 200.7
Matrix: Water	Analyzed: 04/22/2015	Instrument: AAICP (group)

QC1154782LCS1

Strontium	2	1.97	mg/L	99	80-120
Thallium	2	2.00	mg/L	100	80-120
Vanadium	2	2.04	mg/L	102	80-120
Zinc	2	1.93	mg/L	97	80-120

Matrix Spike/Matrix Spike Duplicate Summary

Analyte	Sample Amount	Spike Amount		Spike Result		Units	Recoveries			Limits		Notes
		MS	MSD	MS	MSD		MS	MSD	RPD	%Rec	RPD	
Source: 355221-001												
QC1154782MS1												
Antimony	0.045	1		1.02		mg/L	98			75-125		
Arsenic	ND	1		0.986		mg/L	99			75-125		
Barium	0.071	1		1.03		mg/L	96			75-125		
Beryllium	ND	1		0.912		mg/L	91			75-125		
Boron	0.208	1		1.16		mg/L	95			75-125		
Cadmium	ND	1		0.963		mg/L	96			75-125		
Calcium	70.1	11		83.4		mg/L	121			75-125		
Chromium	ND	1		0.966		mg/L	97			75-125		
Cobalt	ND	1		0.954		mg/L	95			75-125		
Copper	0.004	1		0.970		mg/L	97			75-125		
Iron	0.065	1		1.14		mg/L	108			75-125		
Lead	ND	1		0.908		mg/L	91			75-125		
Lithium	0.521	1		1.18		mg/L	66			75-125		M
Magnesium	25.9	11		40.5		mg/L	133			75-125		M
Manganese	0.006	1		0.966		mg/L	96			75-125		
Molybdenum	0.008	1		0.981		mg/L	97			75-125		
Nickel	ND	1		0.949		mg/L	95			75-125		
Potassium	26.0	10		33.7		mg/L	77			75-125		
Selenium	ND	1		0.766		mg/L	77			75-125		
Silver	ND	0.5		0.512		mg/L	102			75-125		
Sodium	367	11		388		mg/L	191			75-125		NC
Strontium	0.628	1		1.74		mg/L	111			75-125		
Thallium	ND	1		0.894		mg/L	89			75-125		
Vanadium	0.007	1		0.999		mg/L	99			75-125		
Zinc	0.019	1		0.981		mg/L	96			75-125		



QCBatchID: QC1154783	Analyst: Jytagas	Method: EPA 8015B
Matrix: Water	Analyzed: 04/22/2015	Instrument: SVOA-GC (group)

Blank Summary						
Analyte	Blank Result	Units		RDL	Notes	
QC1154783MB1						
TPH (C10 to C22)	ND	mg/L		0.2		
TPH (C22 to C36)	ND	mg/L		0.3		
TPH (C6 to C10)	ND	mg/L		0.2		
TPH Diesel	ND	mg/L		0.1		

Lab Control Spike/ Lab Control Spike Duplicate Summary											
Analyte	Spike Amount		Spike Result		Units	Recoveries		RPD	Limits		Notes
	LCS	LCSD	LCS	LCSD		LCS	LCSD		%Rec	RPD	
QC1154783LCS1, QC1154783LCSD1											
TPH Diesel	1	1	0.76	0.77	mg/L	76	77	1	57-122	30	



QC Batch ID: QC1154789 Analyst: nguyen Method: EPA 625
 Matrix: Water Analyzed: 04/22/2015 Instrument: SVOA-MS (group)

Blank Summary

Analyte	Blank Result	Units	RDL	Notes
QC1154789MB1				
1,2,4-Trichlorobenzene	ND	ug/L	10	
1,2-Dichlorobenzene	ND	ug/L	10	
1,2-Diphenylhydrazine	ND	ug/L	10	
1,3-Dichlorobenzene	ND	ug/L	10	
1,4-Dichlorobenzene	ND	ug/L	10	
2,4,5-Trichlorophenol	ND	ug/L	10	
2,4,6-Trichlorophenol	ND	ug/L	10	
2,4-Dichlorophenol	ND	ug/L	10	
2,4-Dimethylphenol	ND	ug/L	10	
2,4-Dinitrophenol	ND	ug/L	10	
2,4-Dinitrotoluene	ND	ug/L	10	
2,6-Dinitrotoluene	ND	ug/L	10	
2-Chloronaphthalene	ND	ug/L	10	
2-Chlorophenol	ND	ug/L	10	
2-Methyl-4,6-dinitrophenol	ND	ug/L	10	
2-Methylnaphthalene	ND	ug/L	10	
2-Methylphenol (o-Cresol)	ND	ug/L	10	
2-Nitroaniline	ND	ug/L	50	
2-Nitrophenol	ND	ug/L	10	
3,3'-Dichlorobenzidine	ND	ug/L	10	
3-Nitroaniline	ND	ug/L	10	
4-Bromophenyl phenyl ether	ND	ug/L	10	
4-Chloro-3-methylphenol	ND	ug/L	10	
4-Chloroaniline	ND	ug/L	10	
4-Chlorophenyl phenyl ether	ND	ug/L	10	
4-Methylphenol (p-Cresol)	ND	ug/L	10	
4-Nitroaniline	ND	ug/L	10	
4-Nitrophenol	ND	ug/L	10	
Acenaphthene	ND	ug/L	10	
Acenaphthylene	ND	ug/L	10	
Anthracene	ND	ug/L	10	
Benz(a)anthracene	ND	ug/L	10	
Benzidine	ND	ug/L	10	
Benzo(a)pyrene	ND	ug/L	10	
Benzo(b)fluoranthene	ND	ug/L	10	
Benzo(g,h,i)perylene	ND	ug/L	10	
Benzo(k)fluoranthene	ND	ug/L	10	
Benzoic acid	ND	ug/L	10	
Benzyl alcohol	ND	ug/L	10	
Bis(2-chloroethoxy)methane	ND	ug/L	10	
Bis(2-chloroethyl) Ether	ND	ug/L	10	
Bis(2-chloroisopropyl) Ether	ND	ug/L	10	
Bis(2-ethylhexyl) phthalate	ND	ug/L	10	
Butylbenzyl Phthalate	ND	ug/L	10	
Chrysene	ND	ug/L	10	
Dibenz(a,h)anthracene	ND	ug/L	10	
Dibenzofuran	ND	ug/L	10	
Diethyl phthalate	ND	ug/L	10	
Dimethyl phthalate	ND	ug/L	10	
Di-n-butyl phthalate	ND	ug/L	10	
Di-n-octyl phthalate	ND	ug/L	10	

ASSOCIATED LABORATORIES

36594-01

Analytical Results Report
 Lab Request 355169, Page 8 of 13



QC Batch ID: QC1154789

Analyst: qnguyen

Method: EPA 625

Matrix: Water

Analyzed: 04/22/2015

Instrument: SVOA-MS (group)

Analyte	Blank Result	Units	RDL	Notes
QC1154789MB1				
Fluoranthene	ND	ug/L	10	
Fluorene	ND	ug/L	10	
Hexachlorobenzene	ND	ug/L	10	
Hexachlorobutadiene	ND	ug/L	10	
Hexachlorocyclopentadiene	ND	ug/L	10	
Hexachloroethane	ND	ug/L	10	
Indeno(1,2,3-cd)pyrene	ND	ug/L	10	
Isophorone	ND	ug/L	10	
Naphthalene	ND	ug/L	10	
Nitrobenzene	ND	ug/L	10	
N-Nitrosodimethylamine (NDMA)	ND	ug/L	10	
N-Nitrosodi-n-propylamine (NDPA)	ND	ug/L	10	
N-Nitrosodiphenylamine	ND	ug/L	10	
Pentachlorophenol	ND	ug/L	10	
Phenanthrene	ND	ug/L	10	
Phenol	ND	ug/L	10	
Pyrene	ND	ug/L	10	

Lab Control Spike/Lab Control Spike Duplicate Summary

Analyte	Spike Amount		Spike Result		Units	Recoveries			Limits		Notes
	LCS	LCSD	LCS	LCSD		LCS	LCSD	RPD	%Rec	RPD	
QC1154789LCS1, QC1154789LCSD1											
1,2,4-Trichlorobenzene	50	50	31	29	ug/L	62	58	7	40-102	25	
1,4-Dichlorobenzene	50	50	33	32	ug/L	66	64	3	54-90	25	
2,4,5-Trichlorophenol	50	50	45	45	ug/L	90	90	0	57-117	25	
2,4-Dimethylphenol	50	50	38	38	ug/L	76	76	0	52-90	46	
2,4-Dinitrotoluene	50	50	45	47	ug/L	90	94	4	64-111	25	
2-Chlorophenol	50	50	37	37	ug/L	74	74	0	55-105	25	
4-Chloro-3-methylphenol	50	50	48	49	ug/L	96	98	2	42-120	25	
4-Methylphenol (p-Cresol)	50	50	41	41	ug/L	82	82	0	45-96	25	
4-Nitrophenol	50	50	49	52	ug/L	98	104	6	29-115	25	
Acenaphthene	50	50	44	43	ug/L	88	86	2	59-102	25	
Benzo(b)fluoranthene	50	50	41	42	ug/L	82	84	2	61-133	25	
Chrysene	50	50	48	50	ug/L	96	100	4	67-126	25	
N-Nitrosodi-n-propylamine (NDPA)	50	50	51	51	ug/L	102	102	0	35-115	25	
Pentachlorophenol	50	50	35	37	ug/L	70	74	6	37-120	25	
Phenol	50	50	29	29	ug/L	58	58	0	37-79	25	
Pyrene	50	50	44	46	ug/L	88	92	4	68-132	33	



QCBatchID: QC1154797	Analyst: hanhkhong	Method: SM 2320-B
Matrix: Water	Analyzed: 04/23/2015	Instrument: CHEM (group)

Blank Summary

Analyte	Blank Result	Units	RDL	Notes
QC1154797MB1				
Bicarbonate (HCO ₃)	ND	mg/L	5	
Carbonate (CO ₃)	ND	mg/L	5	
Hydroxide (OH)	ND	mg/L	5	
Total Alkalinity (as CaCO ₃)	ND	mg/L	5	

Duplicate Summary

Analyte	Sample Amount	Duplicate Amount	Units	RPD	Limits RPD	Notes
QC1154797DUP1					Source: 355161-001	
Bicarbonate (HCO ₃)	210	210	mg/L	0.0	20	
Carbonate (CO ₃)	ND	ND	mg/L	0.0	20	
Hydroxide (OH)	ND	ND	mg/L	0.0	20	
Total Alkalinity (as CaCO ₃)	173	173	mg/L	0.0	20	



QCBatchID: QC1154865	Analyst: JParedes	Method: EPA 7470A
Matrix: Water	Analyzed: 04/27/2015	Instrument: AAICP-HG1

Blank Summary						
Analyte	Blank Result	Units		RDL	Notes	
QC1154865MB1						
Mercury	ND	ug/L		0.4		

Lab Control Spike/ Lab Control Spike Duplicate Summary											
Analyte	Spike Amount		Spike Result		Units	Recoveries		RPD	Limits		Notes
	LCS	LCSD	LCS	LCSD		LCS	LCSD		%Rec	RPD	
QC1154865LCS1											
Mercury	5		5.16		ug/L	103			80-120		

Matrix Spike/Matrix Spike Duplicate Summary												
Analyte	Sample	Spike Amount		Spike Result		Units	Recoveries		RPD	Limits		Notes
	Amount	MS	MSD	MS	MSD		MS	MSD		%Rec	RPD	
QC1154865MS1, QC1154865MSD1												Source: 355317-001
Mercury	ND	5	5	4.78	4.81	ug/L	96	96	0.8	75-125	20	



QCBatchID: QC1154876	Analyst: wej	Method: EPA 218.6
Matrix: Water	Analyzed: 04/27/2015	Instrument: AAICP (group)

Blank Summary						
Analyte	Blank Result	Units		RDL	Notes	
QC1154876MB1						
Hexavalent Chromium	ND	ug/L		1		

Lab Control Spike/ Lab Control Spike Duplicate Summary											
Analyte	Spike Amount		Spike Result		Units	Recoveries		RPD	Limits		Notes
	LCS	LCSD	LCS	LCSD		LCS	LCSD		%Rec	RPD	
QC1154876LCS1											
Hexavalent Chromium	25		25.6		ug/L	102			80-120		

Matrix Spike/Matrix Spike Duplicate Summary											
Analyte	Sample Amount	Spike Amount		Spike Result		Units	Recoveries		Limits		Notes
		MS	MSD	MS	MSD		MS	MSD	RPD	%Rec RPD	
QC1154876MS1, QC1154876MSD1											Source: 355262-001
Hexavalent Chromium	ND	25	25	29.8	31.2	ug/L	119	125	4.6	75-125	20



Data Qualifiers and Definitions

Qualifiers

B	Analyte was present in an associated method blank. Associated sample data was reported with qualifier.
B1	Analyte was present in an sample and associated method blank greater than MDL but less than DRL. Associated sample data was reported with qualifier.
BQ1	No valid test replicates. Result may be greater. Best result was reported with qualifier. Sample toxicity possible.
BQ2	No valid test replicates.
BQ3	Minimum DO is less than 1.0 mg/L. Result may be greater and reported with qualifier.
C	Laboratory Contamination.
D	RPD was not within control limits, the sample data was reported without further clarification.
D1	Lesser amount of sample was used due to insufficient amount of sample supplied
DW	Sample result is calculated on a dry weigh basis
J	Reported value is estimated
L	The laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) was out of control limits. Associated sample data was reported with qualifier.
M	The matrix spike (MS) or matrix spike duplicate (MSD) was not within control limits due to matrix interference. The associated LCS and/or LCSD was within control limits and the sample data was reported without further clarification.
NC	The analyte concentration in the sample exceeded the spike level by a factor of four or greater, spike recovery and limits do not apply.
P	Sample was received without proper preservation according to EPA guidelines.
P1	Temperature of refrigerator was out of acceptance limit due to technical difficulty.
Q1	Analyte Calibration Verification exceeds criteria and the result was reported with qualifier.
Q2	Analyte calibration was not verified and the result was estimated and reported with qualifier.
Q3	Analyte initial calibration was not available or exceeds criteria. The result was estimated and reported with qualifier.
Q4	Analyte result out of calibration range and was reported with qualifier
S	The surrogate recovery was out of control limits due to matrix interference. The associated method blank surrogate recovery was within control limits and the sample data was reported without further clarification.
T	Sample was extracted/analyzed past the holding time.
T1	Reanalysis was reported past hold time due to failing replicates in the original analysis (BOD only).
T2	Sample was analyzed ASAP but received and analyzed past the 15 minute holding time.
T3	Sample received and analyzed out of hold time per client's request
T4	Sample was analyzed out of hold time per client's request
T5	Reanalysis was reported past hold time. The original analysis was within hold time, but not reportable.
T6	Hold time is indeterminable due to unspecified sampling time.

Definitions

DF	Dilution Factor
MDL	Method Detection Limit. Result is reported ND when it is less than or equal to MDL.
ND	Analyte was not detected or was less than the detection limit.
RDL	Reporting Detection Limit
TIC	Tentatively Identified Compounds



May 18, 2015

Associated Laboratories
 806 N. Batavia
 Orange, CA 92868

Lab ID : SP 1504491
 Customer : 2-11

Laboratory Report

Introduction: This report package contains total of 6 pages divided into 3 sections:

Case Narrative	(2 pages) : An overview of the work performed at FGL.
Sample Results	(2 pages) : Results for each sample submitted.
Quality Control	(2 pages) : Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
355169-001	04/20/2015	04/24/2015	SP 1504491-001	W

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 2 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Inorganic - Metals QC

200.8	05/15/2015:207272 All analysis quality controls are within established criteria.
	05/11/2015:205407 All preparation quality controls are within established criteria, except:
	The following note applies to Uranium: 435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

Radio QC

900.0	05/04/2015:206644 All analysis quality controls are within established criteria.
	05/01/2015:205057 All preparation quality controls are within established criteria.
903.0	05/11/2015:206622 All analysis quality controls are within established criteria.

May 18, 2015
Associated Laboratories

Lab ID : SP 1504491
Customer : 2-11

Radio QC

903.0	04/29/2015:204995 All preparation quality controls are within established criteria.
Ra - 05	05/10/2015:207024 All analysis quality controls are within established criteria.
	05/07/2015:204994 All preparation quality controls are within established criteria.

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **Kelly A. Dunnahoo, B.S.**



Digitally signed by Kelly A. Dunnahoo, B.S.
Title: Laboratory Director
Date: 2015-05-26

ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

May 18, 2015

Lab ID : SP 1504491-001

Customer ID : 2-11

Associated Laboratories

806 N. Batavia
Orange, CA 92868

Sampled On : April 20, 2015-08:00

Sampled By : Client

Received On : April 24, 2015-12:00

Matrix : Water

Description : 355169-001

Project : 355169

Sample Result - Inorganic

Constituent	Result	PQL	Units	Note	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Metals, Total^{P,TS}								
Uranium	ND	2*	ug/L		200.8	05/11/15:205407	200.8	05/15/15:207272

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: HNO₃ pH < 2, HNO₃ pH < 2 ‡Surrogate. * PQL adjusted for dilution.

Corporate Offices & Laboratory

853 Corporation Street
Santa Paula, CA 93080
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory

2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

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FAX: (530)343-3807
CA ELAP Certification No. 2670

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San Luis Obispo, CA 93401
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FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory

9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

FGL
ENVIRONMENTAL AGRICULTURAL
Analytical Chemists

May 18, 2015

Lab ID : SP 1504491-001

Customer ID : 2-11

Associated Laboratories

806 N. Batavia
Orange, CA 92868

Sampled On : April 20, 2015-08:00

Sampled By : Client

Received On : April 24, 2015-12:00

Matrix : Water

Description : 355169-001

Project : 355169

Sample Result - Radio

Constituent	Result ± Error	MDA	Units	MCL/AL	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Radio Chemistry ^{P-15}								
Gross Alpha	17.9 ± 5.92	5.46	pCi/L	15/5	900.0	05/01/15-09:00 2P1505057	900.0	05/04/15-13:00 2A1506644
Total Alpha Radium (226)	19.0 ± 1.49	0.470	pCi/L	3	903.0	04/29/15-18:30 2P1504995	903.0	05/11/15-07:00 2A1506622
Ra 228	0.076 ± 1.00	0.334	pCi/L	2	Ra - 05	05/07/15-18:30 2P1504994	Ra - 05	05/10/15-13:40 2A1507024

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: HNO3 pH < 2, HNO3 pH < 2 * PQL adjusted for dilution.

MDA = Minimum Detectable Activity (Calculated at the 95% confidence level) = Data utilized by DHS to determine matrix interference.

MCL / AL = Maximum Contamination Level / Action Level. Alpha's Action Level of 5 pCi/L is based on the Assigned Value (AV).

AV = Assigned Value(Gross Alpha Result + (0.84 x Error)). CCR Section 64442: Drinking Water Compliance Note: Do the following

If Gross Alpha's (AV) exceeds 5 pCi/L run Uranium. If Gross Alpha's (AV) minus Uranium exceeds 5 pCi/L run Radium 226.

Drinking Water Compliance:

Gross Alpha (AV) minus Uranium is less than or equal to 15 pCi/L

Uranium is less than or equal to 20 pCi/L

Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Note: Samples are held for 3-6 months prior to disposal.

May 18, 2015
Associated Laboratories

Lab ID : SP 1504491
Customer : 2-11

Quality Control - Inorganic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Metals Uranium	200.8	05/11/15:205407amb (SP 1504491-001)	Blank	ug/L		ND	<0.2	435
			LCS	ug/L	50.00	103 %	85-115	
			MS	ug/L	50.00	125 %	75-125	
			MSD	ug/L	50.00	126 %	75-125	
			MSRPD	ug/L	50.00	0.7%	≤20	
	200.8	05/15/15:207272AC	CCV	ppb	120.0	96.6 %	90-110	
			CCB	ppb		0.014	0.2	
			CCV	ppb	120.0	98.5 %	90-110	
			CCB	ppb		0.022	0.2	
Definition CCV : Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria. CCB : Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria. Blank : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples. LCS : Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery. MS : Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery. MSD : Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery. MSRPD : MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis. ND : Non-detect - Result was below the DQO listed for the analyte. DQO : Data Quality Objective - This is the criteria against which the quality control data is compared.								
Explanation 435 : Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.								

May 18, 2015
Associated Laboratories

Lab ID : SP 1504491
Customer : 2-11

Quality Control - Radio

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Radio								
Alpha	900.0	05/04/15:206644caa	CCV CCB	cpm cpm	8955	40.3 % 0.100	37 - 45 0.18	
Gross Alpha	900.0	05/01/15:205057elc (SP 1504472-001)	Blank LCS MS MSD MSRPD	pCi/L pCi/L pCi/L pCi/L pCi/L	180.6 180.6 180.6 180.6	0.93 86.7 % 92.0 % 99.0 % 7.3%	3 75-125 60-140 60-140 ≤30	
Alpha	903.0	05/11/15:206622caa	CCV CCB	cpm cpm	8957	40.7 % 0.100	37 - 45 0.19	
Total Alpha Radium (226)	903.0	04/29/15:204995emv	RgBlk LCS BS BSD BSRPD	pCi/L pCi/L pCi/L pCi/L pCi/L	22.37 22.37 22.37 22.37	0.02 90.1 % 87.2 % 82.4 % 5.7%	2 52-107 43-111 43-111 ≤35.5	
Beta	Ra - 05	05/10/15:207024caa	CCV CCB	cpm cpm	9352	94.1 % 0.4200	85 - 104 0.49	
Ra 228	Ra - 05	05/07/15:204994emv	RgBlk LRS BS BSD BSRPD	pCi/L pCi/L pCi/L pCi/L pCi/L	92.27 92.27 92.27 92.27	-0.05 45.2 % 96.8 % 97.2 % 0.4%	3 27-59 75-125 75-125 ≤25	
Definition CCV : Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria. CCB : Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria. Blank : Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples. RgBlk : Method Reagent Blank - Prepared to correct for any reagent contributions to sample result. LCS : Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery. LRS : Laboratory Recovery Standard - Prepared to establish the batch recovery factor used in result calculations. MS : Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery. MSD : Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery. BS : Blank Spikes - A blank is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery. BSD : Blank Spike Duplicate of BS/BSD pair - A blank duplicate is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery. MSRPD : MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis. BSRPD : BS/BSD Relative Percent Difference (RPD) - The BS relative percent difference is an indication of precision for the preparation and analysis. DQO : Data Quality Objective - This is the criteria against which the quality control data is compared.								



SAMPLE ACCEPTANCE CHECKLIST

Section 1			
Client: <u>Cather-Herly Oil Co</u>	Project: <u>Cal-Fed Pond.</u>		
Date Received: <u>4-20-15</u>	Sampler's Signature Present: <u>(Yes)</u> No		
Sample temperature: _____			
Sample(s) received in cooler: <u>(Yes)</u> No (Skip Section 2)			
Shipping Information: _____			
Section 2			
Was the cooler packed with: <u>✓</u> Ice _____ Ice Packs _____ Bubble Wrap _____ Styrofoam _____			
Cooler 1 Temperature: <u>4.0c</u> Paper _____ None _____ Other _____			
Cooler 2 Temperature: _____ Cooler 3 Temperature: _____			
(Acceptance range is 0 to 6 Deg. C. or arrival on ice; For Microbiology sample ≤ 10 Deg. C or arrival on ice)			
Section 3	YES NO N/A		
Was a COC received?	✓		
Were IDs present?	✓		
Were sampling dates & times present?	✓		
Was a signature present?	✓		
Were tests clearly indicated?	✓		
Were custody seals present?		✓	
If Yes – were they intact?			✓
Were all samples sealed in plastic bags?		✓	
Did all samples arrive intact? If no, indicate below.	✓		
Did all bottle labels agree with COC? (ID, dates and times)	✓		
Were correct containers used for the tests required?	✓		
Was a sufficient amount of sample sent for tests indicated?	✓		
Was there headspace in VOA vials?			✓
Were the containers labeled with correct preservatives?	✓		
Was total residual chlorine measured (Fish Bioassay samples only)? *			✓
*If the answer is no, please inform Fish Bioassay Dept. immediately.			
Section 4			
Explanations/Comments			
Section 5			
Was Project Manager notified of discrepancies: Y / N <u>(N/A)</u>			
Project Manager's response: _____			

Completed By: M. E. Best Date: 4/20/15



Chain of Custody Record

Lab Job No. 355169 of _____



ASSOCIATED LABORATORIES OF MONTROSE ENVIRONMENTAL GROUP, INC.
806 North Batavia • Orange, CA 92868
Phone: (714) 771-6900 • Fax: (714) 771-9933
BILLING ADDRESS: 2 PARK PLAZA, SUITE 1120 • IRVINE, CA 92614

REQUIRED TURN AROUND TIME: Standard: ✓
72 Hours: _____ 48 Hours: _____ 24 Hours: _____

CUSTOMER INFORMATION		PROJECT INFORMATION	
COMPANY: <u>Caltech - Herley Oil Co</u>	PROJECT NAME: <u>CAL-FED POND</u>		
SEND REPORT TO: <u>EMAIL</u>	NUMBER: _____		
EMAIL: <u>Californiagrade@gmail.com</u>	ADDRESS: _____		
ADDRESS: <u>P.O. Box 7397</u>	P.O. #: _____		
<u>Long Beach 90807</u>	SAMPLED BY: <u>C. Elliott</u>		
PHONE: <u>562-714-9551</u>			

ANALYSIS REQUEST
SEE ATTACHED

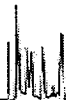
Sample ID	Date	Time	Matrix	Container Number/Size	Pres.	Test Instructions & Comments
1 <u>POND #1</u>	<u>4/20</u>	<u>8:00</u>	<u>Water</u>			
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

Total No. of Samples:		Method of Shipment:		Preservative: 1 = Ice 2 = HCl 3 = HNO ₃ 4 = H ₂ SO ₄ 5 = NaOH 6 = Other	
Relinquished By: <u>C. Elliott</u>	Received By: <u>M. Elliott</u>	1.	2.	Relinquished by	Received By:
Signature: <u>[Signature]</u>	Signature: <u>[Signature]</u>			Signature:	Signature:
Printed Name: <u>C. Elliott</u>	Printed Name: _____			Printed Name:	Printed Name:
Date: <u>4/20</u>	Date: <u>4/20</u>	Time: <u>15:13</u>	Time: <u>15:13</u>	Date:	Date:
				Time:	Time:



Laboratories, Inc.

Environmental Testing Laboratory Since 1949



Date of Report: 04/07/2015

Kurt Buckle

Midway Laboratory

P O Box 1151

315 Main Street

Taft, CA 93268

Client Project: 28567

BCL Project: Misc Samples

BCL Work Order: 1507341

Invoice ID: B200079

Enclosed are the results of analyses for samples received by the laboratory on 3/27/2015. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Misty Orton

Client Service Rep

Authorized Signature

Certifications: CA ELAP #1186; NV #CA00014; OR ELAP #4032-001; AK UST101

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Chain of Custody and Cooler Receipt Form for 1507341 Page 1 of 2

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000341993 4100 Atlas Court Bakersfield, CA 93308 (661) 327-4911 FAX (661) 327-1918 www.bclabs.com P



Laboratories, Inc.

Environmental Testing Laboratory Since 1949

Chain of Custody and Cooler Receipt Form for 1507341 Page 2 of 2

BC LABORATORIES INC.		COOLER RECEIPT FORM		Rev. No. 18	09/04/14	Page	Of 1				
Submission #: <u>15-07341</u>											
SHIPPING INFORMATION Federal Express <input type="checkbox"/> UPS <input type="checkbox"/> Hand Delivery <input checked="" type="checkbox"/> BC Lab Field Service <input type="checkbox"/> Other <input type="checkbox"/> (Specify) _____				SHIPPING CONTAINER Ice Chest <input checked="" type="checkbox"/> None <input type="checkbox"/> Box <input type="checkbox"/> Other <input type="checkbox"/> (Specify) _____		FREE LIQUID YES <input type="checkbox"/> NO <input type="checkbox"/>					
Refrigerant: Ice <input type="checkbox"/> Blue Ice <input checked="" type="checkbox"/> None <input type="checkbox"/> Other <input type="checkbox"/> Comments: _____											
Custody Seals <input checked="" type="checkbox"/> Ice Chest <input checked="" type="checkbox"/> Containers <input checked="" type="checkbox"/> None <input type="checkbox"/> Comments: _____ <small>Intact? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Intact? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></small>											
All samples received? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> All samples containers intact? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Description(s) match COC? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>											
<input checked="" type="checkbox"/> COC Received <input type="checkbox"/> YES <input type="checkbox"/> NO		Emissivity: <u>0.97</u> Container: <u>VO9</u> Thermometer ID: <u>208</u>		Date/Time <u>3/27/15</u>		Analyst Init <u>MVB 0847</u>					
Temperature: (A) <u>2.0</u> °C / (C) <u>1.9</u> °C											
SAMPLE CONTAINERS		SAMPLE NUMBERS									
		1	2	3	4	5	6	7	8	9	10
QT GENERAL MINERAL/ GENERAL											
PT PE UNPRESERVED											
QT INORGANIC CHEMICAL METALS											
PT INORGANIC CHEMICAL METALS											
PT CYANIDE											
PT NITROGEN FORMS											
PT TOTAL SULFIDE											
2oz. NITRATE / NITRITE											
PT TOTAL ORGANIC CARBON											
PT TOX											
PT CHEMICAL OXYGEN DEMAND											
PIA PHENOLICS											
40ml VOA VIAL TRAVEL BLANK											
40ml VOA VIAL		ABC									
QT EPA 413.1, 413.2, 418.1											
PT ODOR											
RADIOLOGICAL											
BACTERIOLOGICAL											
40 ml VOA VIAL- 504											
QT EPA 508/608/8080											
QT EPA 515.1/8150											
QT EPA 525											
QT EPA 525 TRAVEL BLANK											
40ml EPA 547											
40ml EPA 531.1											
8oz Amber EPA 548											
QT EPA 549											
QT EPA 632											
QT EPA 8015M											
QT AMBER											
8 OZ. JAR											
32 OZ. JAR											
SOIL SLEEVE											
PCB VIAL											
PLASTIC BAG											
FERROUS IRON											
ENCORE											
SMART KIT											
Summa Canister											
Comments: _____											
Sample Numbering Completed By: <u>MVB</u> Date/Time: <u>3/27/15 @ 1420</u> (S:\WPDoc\WordPerfect\LAB_DOCS\FORMS\SAMREC)											
A = Actual / C = Corrected											

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

Midway Laboratory
P O Box 1151
315 Main Street
Taft, CA 93268

Reported: 04/07/2015 13:41
Project: Misc Samples
Project Number: 28567
Project Manager: Kurt Buckle

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information			
1507341-01	COC Number:	---	Receive Date:	03/27/2015 08:47
	Project Number:	---	Sampling Date:	03/26/2015 12:00
	Sampling Location:	---	Sample Depth:	---
	Sampling Point:	Cal Fed Pond Entry	Lab Matrix:	Water
	Sampled By:	---	Sample Type:	Water

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**Laboratories, Inc.**

Environmental Testing Laboratory Since 1949

Midway Laboratory
P O Box 1151
315 Main Street
Taft, CA 93268Reported: 04/07/2015 13:41
Project: Misc Samples
Project Number: 28567
Project Manager: Kurt Buckle**Volatile Organic Analysis (EPA Method 8260B)**

BCL Sample ID:	1507341-01	Client Sample Name: Cal Fed Pond Entry, 3/26/2015 12:00:00PM						
Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #
Benzene	1400	ug/L	25	4.2	EPA-8260B	ND	A01,Z1	1
Ethylbenzene	90	ug/L	5.0	0.98	EPA-8260B	ND	A01,Z1a	2
Toluene	1300	ug/L	25	4.6	EPA-8260B	ND	A01,Z1	1
Total Xylenes	660	ug/L	10	3.6	EPA-8260B	ND	A01,Z1a	2
p- & m-Xylenes	440	ug/L	5.0	2.8	EPA-8260B	ND	A01,Z1a	2
o-Xylene	220	ug/L	5.0	0.82	EPA-8260B	ND	A01,Z1a	2
1,2-Dichloroethane-d4 (Surrogate)	96.9	%	75 - 125 (LCL - UCL)		EPA-8260B			1
1,2-Dichloroethane-d4 (Surrogate)	118	%	75 - 125 (LCL - UCL)		EPA-8260B			2
Toluene-d8 (Surrogate)	101	%	80 - 120 (LCL - UCL)		EPA-8260B			1
Toluene-d8 (Surrogate)	102	%	80 - 120 (LCL - UCL)		EPA-8260B			2
4-Bromofluorobenzene (Surrogate)	90.9	%	80 - 120 (LCL - UCL)		EPA-8260B			1
4-Bromofluorobenzene (Surrogate)	97.7	%	80 - 120 (LCL - UCL)		EPA-8260B			2

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-8260B	04/03/15	04/03/15 18:53	SE1	MS-V10	50	BYD0300
2	EPA-8260B	04/02/15	04/03/15 00:18	JMS	MS-V10	10	BYD0300

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**Laboratories, Inc.**

Environmental Testing Laboratory Since 1949

Midway Laboratory
P O Box 1151
315 Main Street
Taft, CA 93268Reported: 04/07/2015 13:41
Project: Misc Samples
Project Number: 28567
Project Manager: Kurt Buckle**Volatile Organic Analysis (EPA Method 8260B)****Quality Control Report - Method Blank Analysis**

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: BYD0300						
Benzene	BYD0300-BLK1	ND	ug/L	0.50	0.083	
Ethylbenzene	BYD0300-BLK1	ND	ug/L	0.50	0.098	
Toluene	BYD0300-BLK1	ND	ug/L	0.50	0.093	
Total Xylenes	BYD0300-BLK1	ND	ug/L	1.0	0.36	
p- & m-Xylenes	BYD0300-BLK1	ND	ug/L	0.50	0.28	
o-Xylene	BYD0300-BLK1	ND	ug/L	0.50	0.082	
1,2-Dichloroethane-d4 (Surrogate)	BYD0300-BLK1	97.3	%	75 - 125 (LCL - UCL)		
Toluene-d8 (Surrogate)	BYD0300-BLK1	102	%	80 - 120 (LCL - UCL)		
4-Bromofluorobenzene (Surrogate)	BYD0300-BLK1	97.8	%	80 - 120 (LCL - UCL)		

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

Midway Laboratory
P O Box 1151
315 Main Street
Taft, CA 93268

Reported: 04/07/2015 13:41
Project: Misc Samples
Project Number: 28567
Project Manager: Kurt Buckle

Volatile Organic Analysis (EPA Method 8260B)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab
								Percent Recovery	RPD	Quals
QC Batch ID: BYD0300										
Benzene	BYD0300-BS1	LCS	28.100	25.000	ug/L	112		70 - 130		
Toluene	BYD0300-BS1	LCS	27.170	25.000	ug/L	109		70 - 130		
1,2-Dichloroethane-d4 (Surrogate)	BYD0300-BS1	LCS	10.020	10.000	ug/L	100		75 - 125		
Toluene-d8 (Surrogate)	BYD0300-BS1	LCS	9.8800	10.000	ug/L	98.8		80 - 120		
4-Bromofluorobenzene (Surrogate)	BYD0300-BS1	LCS	9.7900	10.000	ug/L	97.9		80 - 120		

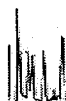
The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949



Midway Laboratory
P O Box 1151
315 Main Street
Taft, CA 93268

Reported: 04/07/2015 13:41
Project: Misc Samples
Project Number: 28567
Project Manager: Kurt Buckle

Volatile Organic Analysis (EPA Method 8260B)

Quality Control Report - Precision & Accuracy

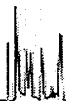
									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: BYD0300		Used client sample: N									
Benzene	MS	1507348-01	ND	25.520	25.000	ug/L		102		70 - 130	
	MSD	1507348-01	ND	28.050	25.000	ug/L	9.4	112	20	70 - 130	
Toluene	MS	1507348-01	ND	25.610	25.000	ug/L		102		70 - 130	
	MSD	1507348-01	ND	27.380	25.000	ug/L	6.7	110	20	70 - 130	
1,2-Dichloroethane-d4 (Surrogate)	MS	1507348-01	ND	9.9800	10.000	ug/L		99.8		75 - 125	
	MSD	1507348-01	ND	10.080	10.000	ug/L	1.0	101		75 - 125	
Toluene-d8 (Surrogate)	MS	1507348-01	ND	10.110	10.000	ug/L		101		80 - 120	
	MSD	1507348-01	ND	9.8400	10.000	ug/L	2.7	98.4		80 - 120	
4-Bromofluorobenzene (Surrogate)	MS	1507348-01	ND	10.180	10.000	ug/L		102		80 - 120	
	MSD	1507348-01	ND	9.6400	10.000	ug/L	5.4	96.4		80 - 120	

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949



Midway Laboratory
P O Box 1151
315 Main Street
Taft, CA 93268

Reported: 04/07/2015 13:41
Project: Misc Samples
Project Number: 28567
Project Manager: Kurt Buckle

Notes And Definitions

MDL Method Detection Limit
ND Analyte Not Detected
PQL Practical Quantitation Limit
A01 Detection and quantitation limits are raised due to sample dilution.
Z1 50 uL of antifoamer added to sample VOA
Z1a 50uL of antifoamer was added to sample VOA

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Midway Laboratory, Inc CHAIN OF CUSTODY FORM

LOG NUMBER: 28567

COMPANY: Cather Herley Oil Company
 CONTACT(S): Curtis Elliott
 PHONE: 562-424-1069 CELL: 562-714-9551 FAX: _____
 ADDRESS: P.O. Box 7397
Long Beach, CA 90807
 EMAIL (S): californiacrude@gmail.com
 SAMPLER: [Signature]
 SAMPLER SIGNATURE REQUIRED ABOVE

ANALYSIS REQUESTED

CONDENSATE
IDS
Chloride
PEROX
STET

PRESERVATIVE LIST
 Please indicate preservative required using the corresponding letter at the top of the list.

A	HCl - Hydrochloric Acid
B	H2SO4 - Sulfuric Acid
C	HNO3 - Nitric Acid
D	NaOH - Sodium Hydroxide
E	Na3S2O3 - Sodium Thiosulfate
F	Zn Acetate - Zinc Acetate
G	Other (Please specify in comments)

SAMPLE CONDITION
 AT TIME OF ARRIVAL IN THE LAB
 PLEASE CHECK THE APPROPRIATE BOXES BELOW:

☐ COOL
☐ RECEIVED ON ICE
☐ WARM
☐ ROOM TEMPERATURE
☐ SAME DAY SAMPLING
 TEMPERATURE MUST BE TAKEN FOR ALL DRINKING WATER SAMPLES
 UPON ARRIVAL IN THE LAB
 THESE ARE TAKEN WITH THE TEMP GUN

CONTAINER TYPES

GLASS
 AG - AMBER GLASS
 MC - METAL CYLINDER
 PL - PLASTIC
 ST - STIRRED
 TC - TEFALON COATED
 O - OTHER

TEMP

TEMPERATURE PRESSURE

At time of sampling in field

SAMPLE MATRIX

Q - GAS
 L - LIQUID
 LNG - LIQUEFIED
 NATURAL GAS
 LPG - LIQUEFIED
 PETROLEUM GAS
 O - OIL
 S - SOIL
 SLD - SLOD
 SL - SLUDGE
 DW - DRINKING WATER
 W - WATER

INSTRUCTIONS FOR OUTLABBING

ANALYSIS:
 ALL outlabeled analysis MUST include the method numbers for requested analysis.
 ALL drinking water samples MUST include:
 Source Numbers
 Sample's Name
 Lab MUST be aware that analysis is to be reported to the State

IF COMPANY REQUIRES
 PO NUMBER, PM NUMBER
 OR COST CODE
 PLEASE LIST BELOW:

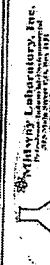
TIME: _____
 MILEAGE: _____

COMMENTS:

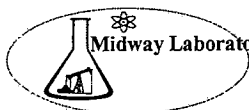
THIS SPACE RESERVED FOR LABORATORY USE ONLY

CHAIN OF CUSTODY SIGNATURE RECORD

1. [Signature] DATE 3/26 TIME 19:45
 RECEIVED BY
 1. Cather Herley DATE 3/26/15 TIME 12:46
 RECEIVED BY
 1. _____ DATE _____ TIME _____
 RECEIVED BY
 1. _____ DATE _____ TIME _____



MR 12:47PM



CUSTOMER: Cather Herley Oil Company
ADDRESS: P.O. Box 7397
Long Beach, CA 90807
ATTENTION: Curtis Elliott

LOG NUMBER: 28567
DATE RECEIVED: 03-26-15
DATE COMPLETED: 04-02-15
REPORT DATE: 04-02-15

SAMPLE DESCRIPTION: Cal-Fed Pond Entry

SAMPLE MATRIX: W = Water

ANALYTICAL PARAMETER: Boron, Chloride, Conductivity, Total Dissolved Solids (TDS)

Analytical Parameter	Results	PQL	Method Number
Boron (B)	148 (mg/L)	0.01	EPA 200.7
Chloride (Cl)	14,500 (mg/L)	2.0	EPA 300.0
Conductivity	52,300 (umhos/cm)	-	SM 2510 B
TDS	32,100 (mg/L)	-	SM 2540 C

NOTES:

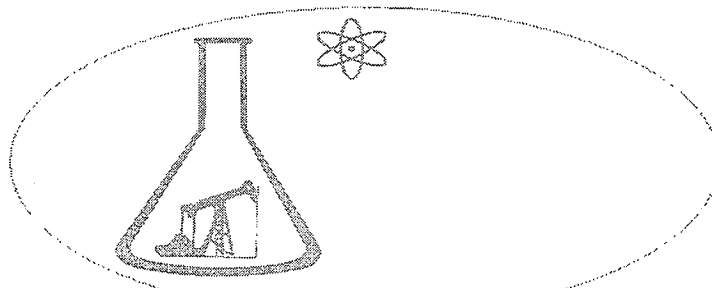
- 1) **PQL** = Practical Quantitation Limit is the lowest level that can be reliably achieved within specific limits of precision and accuracy. It also depends upon the size and digestion/analytical techniques employed.
- 2) **N.D.** = Not Detected

REFERENCES:

- 1) ALPHA-AWWA-WPCF, "Standard Methods for the Examination of Water and Wastewater," 18th Edition.
- 2) EPA, "Methods for Chemical Analysis of Water and Wastes," 1983 United States Environmental Protection Agency, EPA 600/4-79-020, Revised March 1983.

Q.C. _____ Date: _____

Q.C. _____ Date: _____



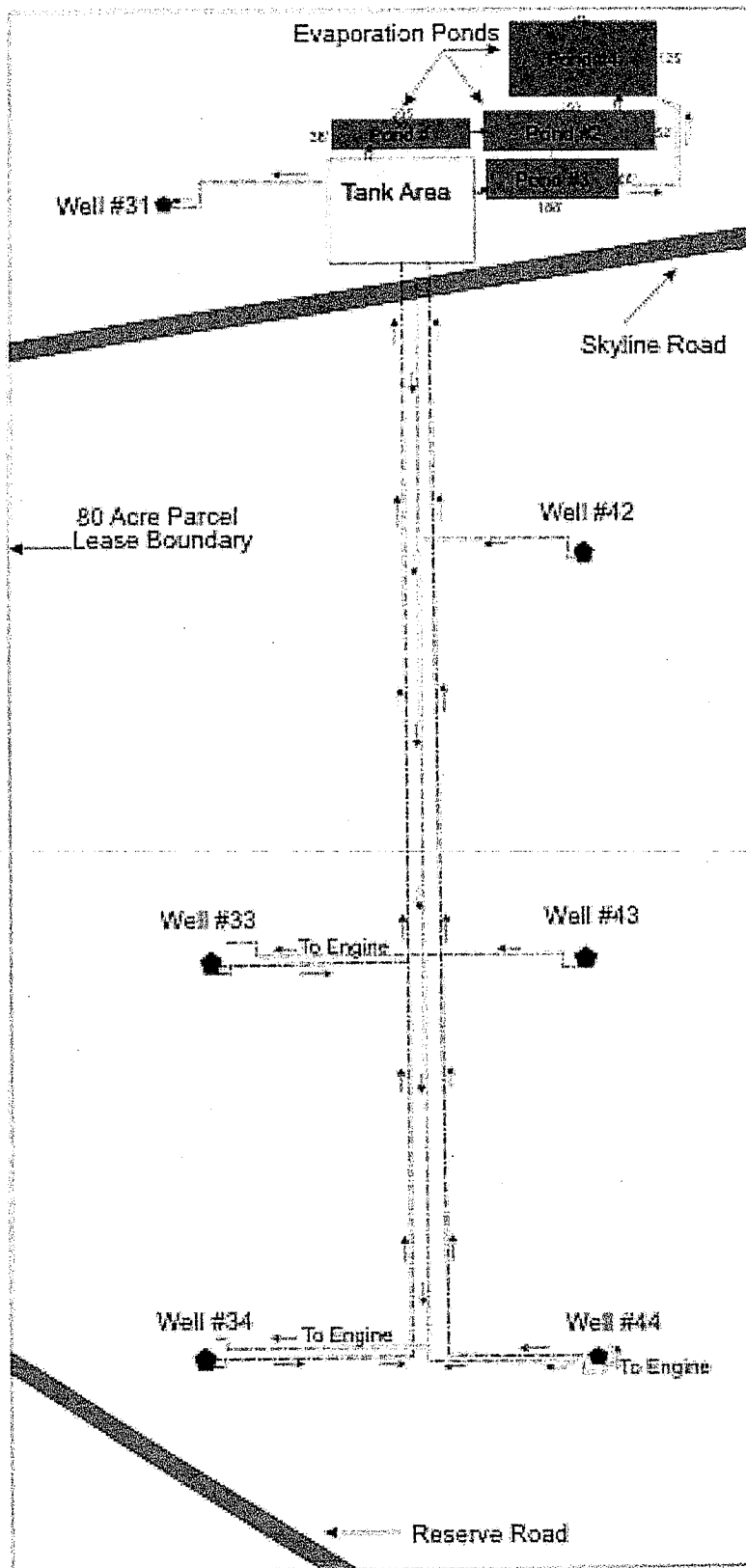
Date: _____

Kurt R. Buckle - Laboratory Director

Midway Laboratory, Inc.

ATTACHMENT

B



Cather-Herley Oil Co.

California Federal "A"
Lease
CAS 071813-A

- Production Fluid
- Brine Water
- Natural Gas
- Well Head
- Pipelines

Sec. 26, Twp. 30S, Rge. 22E

Scale Approx 1 inch : 260 ft

Latitude 35.295863
Longitude -119.582137
DMS Lat 35° 17' 45.1068" N
DMS Long 119° 34' 55.6932" W

Pond Dimensions

#1 205'L 38"W 11'D
#2 250'L 52"W 12'D
#3 188'L 66"W 13'D
#4 240'L 125"W 14'D

ATTACHMENT

C



Terry Tamminen
Secretary for
Environmental
Protection

California Regional Water Quality Control Board

Central Valley Region

Robert Schneider, Chair

Fresno Branch Office

Internet Address: <http://www.swrcb.ca.gov/~rwqcb5>
1685 E Street, Fresno, California 93706-2020
Phone (559) 445-5116 • FAX (559) 445-5910



Arnold Schwarzenegger
Governor

16 January 2004

Mr. Bob Ferguson
Bob Ferguson, Independent
23072 Lake Center Drive, Suite 205
Lake Forest, CA 92630-2880

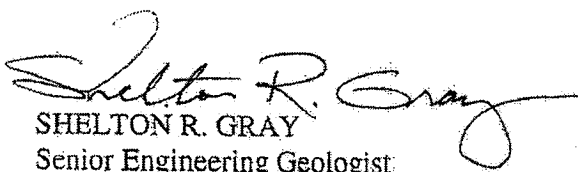
Mr., Charles E. Cather
Cather-Herley Oil Company
P. O. Box 7397
Long Beach, CA 90807-0397

Mr. Joe Ippolito
Crimson Resource Management
5500 Ming Avenue, Suite 480
Bakersfield, CA 93309

HYDROGEOLOGIC CHARACTERIZATION REPORT, ASPHALTO OIL FIELD, KERN COUNTY

Regional Board staff has reviewed the 1 December 2003 Asphalto Oil Field report prepared by Geomega Consultants. Our comments are provided in the attached staff memorandum. We concur with the conclusions contained in the report. In the near future, revised waste discharge requirements will be drafted for public review and comment and eventually for Regional Board consideration.

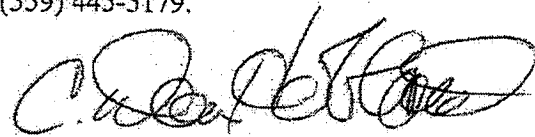
If you have any questions, please call Dean Hubbard at (559) 445-5179.


SHELTON R. GRAY
Senior Engineering Geologist

CDH:cdh

Attachment

cc: Ms. Patricia D. Gradek, BLM, Bakersfield
Mr. Reed Bowles, CDOGGR, Bakersfield
Mr. Jeffrey A. Anderson, Geomega, Boulder, CO



C. DEAN HUBBARD
Associate Engineering Geologist
RG No. 6357

California Environmental Protection Agency



Terry Tamminen
Secretary for
Environmental
Protection

California Regional Water Quality Control Board

Central Valley Region

Robert Schneider, Chair

Fresno Branch Office

Internet Address: <http://www.swrcb.ca.gov/~rwqcb5>
1685 E Street, Fresno, California 93706-2020
Phone (559) 445-5116 • FAX (559) 445-5910



Arnold Schwarzenegger
Governor

TO: Shelton R. Gray

FROM: C. Dean Hubbard

DATE: 16 January 2004

SIGNATURE: 

SUBJECT: HYDROGEOLOGIC CHARACTERIZATION REPORT – ASPHALTO OIL FIELD

I have reviewed the *Hydrogeologic Characterization Report – Asphaltto Oil Field*, prepared for Bob Ferguson Independent, Cather-Herley Oil Company, and Crimson Resource Management, dated 1 December 2003 and submitted by Geomega Consultants (Geomega).

INTRODUCTION

Geomega, on behalf of the Asphaltto Oil Field operators, has completed a site-specific hydrogeologic evaluation for the Asphaltto Oil Field (Asphaltto) in the McKittrick Valley, Kern County (Figure 1). Asphaltto, which occupies approximately 4 square miles, is situated near the center of McKittrick Valley, which encompasses an area of approximately nine square miles (Figure 2).

The purpose was to evaluate the applicability of continuing the discharges of oil field produced water into unlined surface impoundments for evaporation and/or percolation within Asphaltto in accordance with current California guidelines and regulations. The report assessed the existence of groundwater in the McKittrick Valley, and evaluated the potential for produced water migration from the McKittrick Valley.

Geomega's report summarizes electrical geophysical log data from exploratory borings, an existing oil production well, groundwater data, analyses of produced water, and provides an interpretation of the geology and hydrogeology of Asphaltto and McKittrick Valley. The consultant utilized existing data from a variety of resources including: the three oilfield operators, the California Division of Oil, Gas, and Geothermal Resources (CDOGGR), Department of Water Resources (DWR), U. S. Geological Survey (USGS) topographic maps, California Division of Mines and Geology – Geological Maps, and information from PG&E's La Paloma generating facility.

REPORT CONCLUSIONS AND MY COMMENTS

Based upon the review of various historical documents and the current reference sources listed above, the consultant presented conclusions as shown below in italics. My comments follow each item.

- 1. There appears to be no alluvial groundwater in the McKittrick Valley on the basis of three geophysical logs and a well test (PG&E La Paloma #1, La Paloma #2, and Berry 33X). First groundwater was encountered 545 feet below ground surface in a confined Upper Tulare sand in La Paloma #2 with 6,100 mg/L TDS water quality.*

I reviewed geophysical logs from the La Paloma #1 and La Paloma #2 borings, located within the area where the operators propose to continue discharging produced water to existing unlined surface impoundments. Another geophysical log reviewed was from Berry Petroleum production well 33X,

located at the northwest end of McKittrick Valley, approximately 1.75 miles northwest of the operators impoundments.

From my interpretation of the La Paloma #2 geophysical log and review of the analytical groundwater sample results from the same well, the first groundwater has a TDS concentration of 6,100 mg/L. This brackish groundwater occurs in a confined sand within the Upper Tulare Fm, at approximately 545-feet deep, and is the uppermost groundwater encountered in McKittrick Valley. This Upper Tulare Fm sand is nearly 200-feet below the basal alluvial clay layer that could provide a perching layer for percolating produced water (discussed in item # 4 below).

Based on a detailed geologic interpretation of the geophysical logs and related data, I can concur with the consultant's conclusion.

2. The nearest water wells are 17 miles southeast of Ford City, near the terminus of Buena Vista Valley.

I concur with the consultant's findings and review of DWR records confirming that there are no agricultural or domestic drinking water wells within the study area. A review of DWR database documenting water well locations and analytical data identified five water wells to the southeast, approximately 17 miles outside of McKittrick Valley and not hydrologically connected to the area.

3. The McKittrick Valley is narrow, long and physically constrained by Plio-Pleistocene outcrops on three sides.

My review of the USGS topographic maps and California geologic maps confirms that the valley is physically elongated (northwest-southeast) and that the Pliocene-Pleistocene Tulare Fm outcrops along three sides, dipping into McKittrick Valley (Figures 1 and 2). The Elk Hills are adjacent along the northeast to southeast side of McKittrick Valley and Buena Vista Hills are present along the northwest to southwest side of the valley.

4. Infiltrating produced water will likely be geohydrologically contained within the limits of the Asphalto Oil Field due to the structural configuration of the basal alluvial and Upper Tulare clay.

My review and interpretation of the geologic data, geologic cross-sections, and geophysical logs indicates that approximately 350-feet of alluvial sediments are present in McKittrick Valley. The alluvial section is underlain by an approximately 62-foot thick, laterally continuous, basal alluvial clay, as can be noted beginning at 366-feet in La Paloma #2. This basal clay, seen on the La Paloma and Berry Petroleum 33X geophysical electric logs, suggests that the clay layer occurs throughout the valley, and would act as a perching layer for produced water migrating from unlined surface impoundments.

Additional review of the geophysical logs indicates that the bottom of the upper alluvial sediments in the Berry 33X well, dipping inward to La Paloma #2, confirms that the elongated and continuous nature of the structure dips inward towards the center of McKittrick Valley. Further review of the geological maps and other data, suggests the inward dipping nature of the Plio-Pleistocene outcrop surrounding McKittrick Valley was created during "downwarping" of the alluvium and basal clay during deposition. Therefore, the "downwarping" of the basal alluvial clay resulting in a structural basin near the center of the valley, would act to contain wastewater within the area.

Following my review of the cross-sections, structure contour figures, and geologic data, I can concur with the consultant's conclusion.

5. Forecast disposal volumes and rates of produced water are relatively small (7,421 acre-feet).

Using the annual estimated produced water volumes reported to the CDOGGR and records provided by the three companies and a discharge rate of approximately 2,720 barrels of water per day discharge to the

surface impoundments (includes a 20% average annual precipitation rate), I concur with the consultants conclusion.

According to the operators, a portion of the produced water is disposed of into injection wells. The consultant, however, did not use this volume to derive the volume disposed of over the life of the field (1962 - 2020). Consequently, the estimated volume would be only slightly less if the produced water going to injection were included in the calculations.

The Asphalto operators have projected that at the current production rates, the field will likely be depleted within approximately 15-years (to 2020) and would no longer be a viable oil producer. They also indicated that as oil production declined, the volume of water would decrease. CDOGGR staff indicated that production may extend a few years beyond 2020 and as oil production continued to taper off, the field would no longer be a viable economic producer. In addition, according to CDOGGR, the potential for future exploration and new discoveries in Asphalto is nil.

6. There is vast storage capacity for produced water within the Buena Vista (McKittrick) Valley vadose zone, and the Asphalto produced water volume is approximately 0.8% of this available capacity.

It appears that the consultant estimated that the bottom of the McKittrick Valley structure to be somewhat flat, rectangular, and of uniform thickness throughout with the unsaturated zone extending downward to approximately 550-feet (first groundwater; see #1 above). The consultant's estimate resulted with the unsaturated zone generally 550-feet thick and McKittrick Valley with dimensions of 2.5 x 4.5-miles. Based on an estimated 30% porosity, this translates to approximately 950,000 acre-feet of available pore space to contain 7,421 acre-feet of produced water, or less than 1% of the available volume.

Using a maximum projected depth at the top of the basal clay layer, I recalculated the alluvial storage capacity by assuming the bottom of the structure to be somewhat curved and concave with an unsaturated interval to the top of the basal clay layer that ranged from 350-feet to approximately 400-feet at the lowest portion of the structure. Using a revised mass volume calculation of alluvium to the top of the clay layer and the same porosity (30%), I estimated that the produced water volume would occupy approximately 5% of the available volume.

When compared to the total available storage capacity, even though slightly higher, my estimate of the available pore space that would be occupied is quite small. I can still concur that there should be sufficient storage capacity within the valley.

7. Estimated lateral transport of the infiltrating water from the impoundments is minimal (433 to 606 feet).

By applying the results of similar recent oil field modeling and hydrogeologic studies, I can generally agree with the consultants conclusion that the produced water has likely spread no more than 400-500 feet from the impoundments (or 3 to 4 times their radius). If the operators continue discharging wastewater at a similar rate, wastewater is not likely to migrate more than 600-1000 feet laterally from the impoundments (Figure 2).

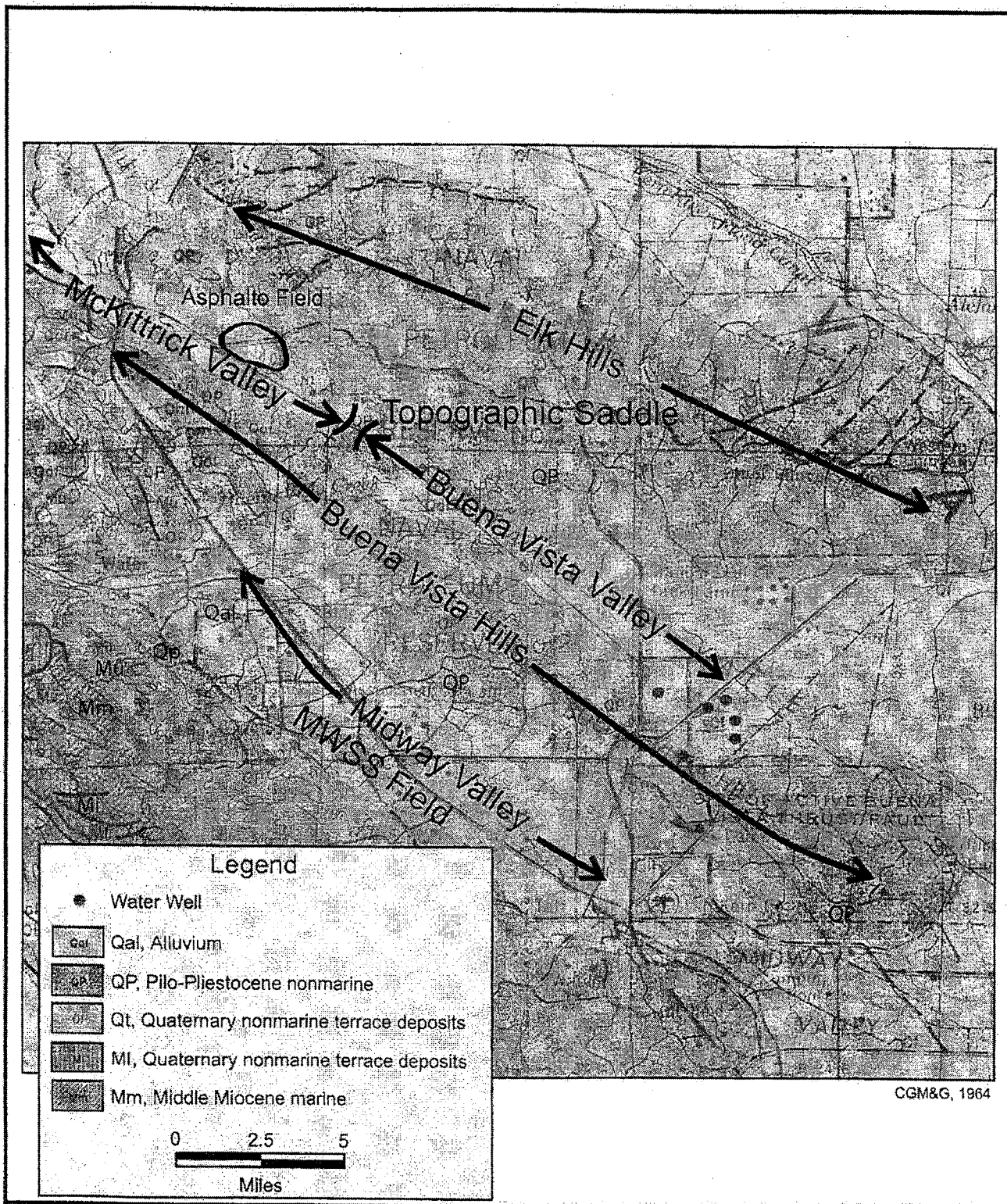
8. The predicted maximum extent of produced water mounds will not reach spill points from the McKittrick Valley.

My review and calculations of the available pore space storage volume discussed above, indicates that approximately one to five per cent of the available pore space could be utilized for produced water storage in Asphalto. Therefore, I can concur with the consultants findings that during the life expectancy of the oil field as stated in the report, produced wastewater would not be expected to exceed the available pore space within McKittrick Valley, or reach the "spill points" allowing produced water to flow into adjacent areas (Figure 2).

SUMMARY OF CONSULTANTS CONCLUSIONS

In conclusion, the geohydrological conditions at Asphalto restrict the migration of infiltrating produced water to within the limits of the oilfield proper and therefore, will not allow transport into areas adjacent to the oilfield. This produced water management practice is protective of groundwater resources of the State.

Based on my report review, calculations, review of the data and historical documents, I concur with the consultant's conclusions that McKittrick Valley has adequate storage capacity within the unsaturated zone to contain the current and projected volumes of produced wastewater. Based on the hydrogeologic conditions, disposal would not pose a threat to impact the uppermost groundwater, and discharges to unlined surface impoundments would not present a threat to waters of state. Produced water in the subsurface should migrate toward the lowest central portion of the valley and accumulate on the basal alluvial clay layer, and not flow out of the McKittrick Valley to adjacent areas.



Generation
Date:
11/21/03

Figure 1. Nearest water wells
and surface geology map.



